

Corrosion Minimization Using Surfactants and Education

Michael L. Free, University of Utah, DMR Award #9983945

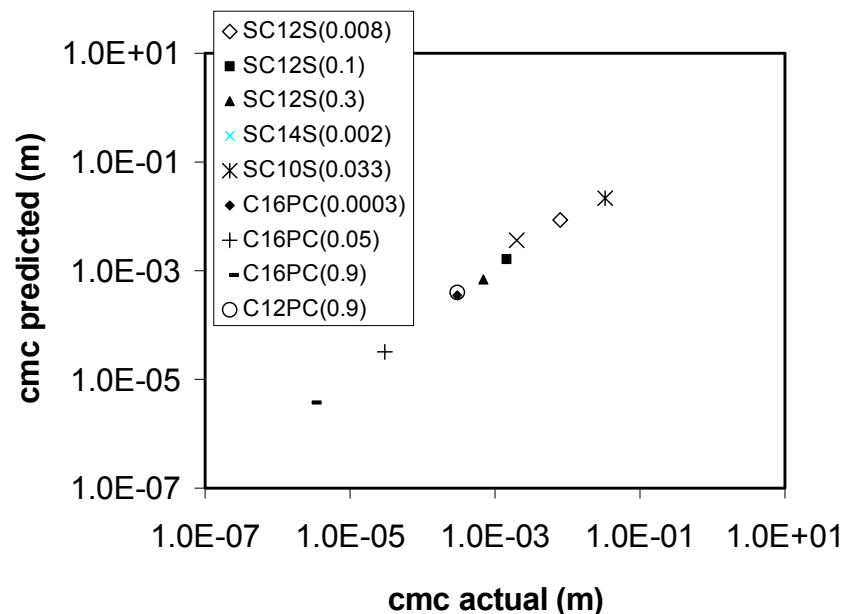
Prediction of Corrosion Inhibition

- A mathematical equation to predict corrosion inhibition using surfactants has been developed based upon surfactant adsorption behavior in solution.
- This equation can be used by engineers to predict surfactant corrosion inhibitor performance using surfactant adsorption behavior information.
- Another equation has been developed to predict the effect of solution environment and surfactant properties on the critical micelle concentration (cmc) and surfactant adsorption behavior in solution.
- The second equation has important applications in separation and cleaning technologies as well as biological systems.



M. L. Free, "Understanding the Effect of Surfactant Aggregation..." Corrosion Science, 44(12), 2865, 2002

M. L. Free, "The Development and Application of Useful Equations to Predict ...", Corrosion, 58(12), 1025, 2002.



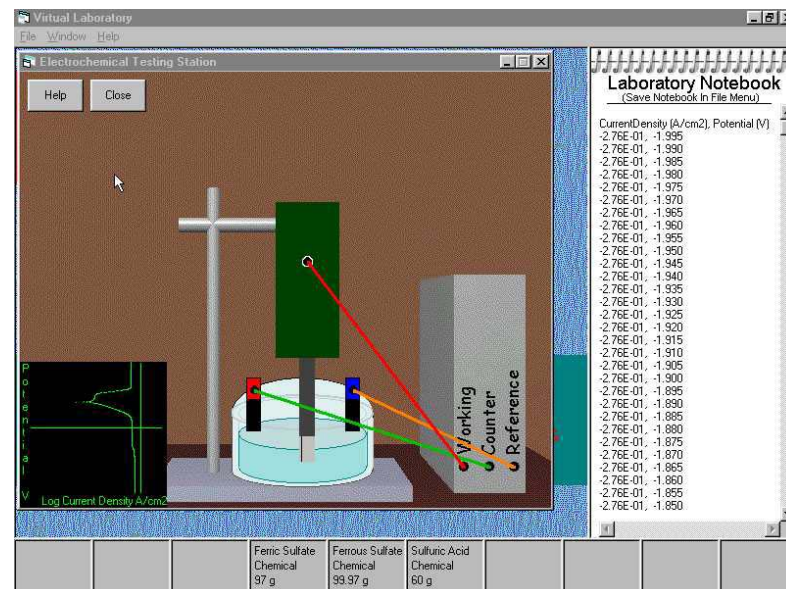
The figure above shows a comparison of predicted (using the equation developed in this study) and measured cmc values for surfactants under various ionic strength conditions. The cmc is an important indicator of the ability of surfactant molecules to adsorb at surfaces and inhibit corrosion.

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Training

- 4 graduate students (Manish Sharma, Dong Ryu, Lei Chen, and Ravindra Bhide) participated in research.
- 3 undergraduate students, David Harding, Rebecca Cook, and Eric Riddle have worked on various components of this project.
- An on-line corrosion course that was prepared through this project has been offered through ASM-International for maximum dissemination of important corrosion minimization principles and applications.
- 30 Students taking corrosion-related courses utilized laboratory equipment to analyze corrosion experiments.



Virtual Corrosion Laboratory Software Screen Sample

Outreach

- Presentations about careers in science and engineering have been made to approximately 730 local high school students. Presentations about metals have been made to 150 additional students.
- 20 high school students and two high school teachers have participated in corrosion workshops that allowed them to prepare and analyze metal corrosion specimens as well as to simulate corrosion experiments using a virtual corrosion laboratory (see figure) developed as part of this project.